Technical Memorandum

for

SA3-A Contaminated Sediment Removal Operations

Portage Creek Area Removal
Kalamazoo, Michigan

Prepared for:

USEPA Region 5
Emergency Response Branch
77 West Jackson
Chicago, IL 60604

Contract No. EP-S5-08-02
Task Order No. 0087

EQ Project No.: 030281.0087

Prepared by:

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February 2013

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CONTENTS

Section Page

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ATTACHMENTS

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1 Figures

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TABLES

FIGURES

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1. INTRODUCTION

Environmental Quality Management, Inc. (EQ) has been tasked with performing a time-critical-removal action (TCRA) to remove polychlorinated biphenyl (PCB) contaminated sediments from targeted locations over a 1.8-mile section of Portage Creek. The Portage Creek Area Site (Site) is a portion of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site. Located in Kalamazoo County, Michigan, this site is pervasively contaminated with PCBs as a result of historic waste practices associated with several paper mills. The Site was listed on the National Priorities List (NPL) on August 30, 1990. The Portage Creek Site is located in the City of Kalamazoo, Michigan, beginning at East Cork Street and extending northward approximately 3 miles to the confluence of the Kalamazoo River. Activities associated with this removal action are anticipated to occur in segments along a 1.8-mile stretch of Portage Creek. Work activities will move downstream primarily between Reed Avenue to East Walnut Street bridge, South Pitcher Street bridge to the railroad crossing west of Rochester Street, and the bend in Portage Creek east of Rochester Street to the confluence with the Kalamazoo River (Figure 1, Site Location Map, Attachment 1).

A comprehensive description of the project is provided in the Work Plan (composed of sediment removal area technical memorandums and other site documents) for the Portage Creek Area Time-Critical Removal Action. The section of Portage Creek targeted for action has been divided into 10 distinct removal areas (Figure 2, Sediment Removal Areas, Attachment 1). The areas targeted for removal will be referred to as SA1-A, SA1-B, SA1-C, SA3-A, SA5-A, SA5-C, Axtell Creek, SA5-D, SA6, and SA7. This technical memorandum will focus on establishing support facilities and contaminated sediment removal operations in the SA3-A Area. Approaches described in this technical memorandum supersede all other removal approaches discussed to date in related submittals.

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2. PROJECT PREPARATION

EQ performed the following activities to prepare the Portage Creek Area Site for contaminated sediment excavation in SA3-A.

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2.1 Pre-excavation Sampling of Data Gap Area SA3-A

2.1.1 Sampling

EQ conducted sampling at dredging area SA3-A on October 22, 2012 to further define the extent of contamination and to finalize the removal depths required. Grids 1 through 8 of SA3-A were sampled to verify removal depth and extent of excavation. Analytical results of sampling did not impact work described in this Technical Memorandum.

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2.1.2 Analyses

Samples were analyzed for total PCBs by ALS Global of Holland Michigan. Analyses verified that sediment contaminant levels for PCBs were below TSCA disposal limits, and would be acceptable for Subtitle D Landfill Disposal.

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3. SA3-A CONTAMINATED SEDIMENT REMOVAL

The SA3-A dredging area is primarily located within a parcel of property owned by Nature Ventures, Inc. and Norfolk Southern Railroad (leased to WATCO Companies) that lies to the east of the Pitcher Street and extends south of Michigan Avenue. SA3-A is subdivided into eight grids. Seven grids are within the creek channel and one grid is located in a flood plain located along the southern side of the creek. SA3-A extends north of the railroad to the northeast and is bounded by a second railroad bridge. The sediment removal depth for the entire area extends to 30 inches below the existing creek bottom, which includes an estimated 6 inches of over-dredge depth.

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The overall surface area to be excavated and dredged in SA3-A is anticipated to be approximately 15,722ft². The approximate overall dimensions are 354 ft long with an average width per excavation area segment of 35.7 ft. EQ will dredge sediments that will require non-TSCA disposal at a Subtitle D Landfill (approximately 1,456 yd³). Table 1 presents excavation details.

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Table 1. SA3-A Excavation Details

Grid	Dimensions, ft	Removal Depth, in.	Surface Area/Volume of Subtitle D Soils
SA3-A1	42’ W by 46’ L	30	1677 ft²/155 yd³
SA3-A2	28.2’ W by 46.2’ L	30	1234 ft²/114yd³
SA3-A3	33’ W by 128’ L	30	3524 ft²/326 yd³
SA3-A4	30.5’ W by 47.9’ L	30	1398 ft²/129 yd³
SA3-A5	31’ W by 49.7’ L	30	1598 ft²/148 yd³
SA3-A6	32.7’ W by 59.7’ L	30	1729 ft²/160 yd³
SA3-A-7	42.8’ W by 50.8’ L	30	2350 ft²/218 yd³
SA3-A-8	41’ W by 61’ L	30	2212 ft²/205 yd³

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3.1 Pre-Sediment Removal Preparation

3.1.1 Waste Characterization Sampling Soil

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EQ collected characterization soil samples during the October 2012 sampling event previously described. Sampling was performed in compliance with the EQ Field Sampling Plan (FSP) dated August 2011 that provided information on the number of samples, collection method, and exact analyses to be performed. The soils were analyzed for landfill disposal parameters.

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3.1.2 Pre-Sediment Removal Condition Assessment

EQ provided a structural engineer to perform a pre-sediment removal assessment of constructed features in and adjacent to the creek channel excavation areas. Details of this assessment are provided in a report entitled "Pre-Sediment Removal Structure Feature Assessment Removal Areas SA3-A, SA3-B and SA3-Access" dated August 2012 prepared by Fleis and Vandenbrink Engineering Inc. The report identifies the structural features in the SA3-A work areapresented in Table 2. Table 3 presents the potential impact of the constructed features of SA3-A on dredging operations.

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Table 2. SA3-A Constructed Features

Report Designation	Location	Constructed Features
SA3-A-01	South end of SA3-A Excavation Area	• 2 railroad bridges • 1 supplemental bridge • 42-in. stormwater outlet (SWO)(southwest bank) • Failed sheet pile around 42-in. SWO • Conduit (containing fiber optic line) north side of bridge (failed) • Conduit south side of bridge
SA3-A-02	Central region of Grid Area SA3-A3	• Timber utility pole and associated guy wires (to be removed)
SA3-A-03	Central region of SA3-A2	• Concrete slabs used as rip-rap for bank stabilization (to be removed)
SA3-A-04	North end of SA3-A7 and south end of SA3-A8	• Abandoned railroad bridge
SA3-A-05	North end of SA3-A8	• Railroad bridge with concrete abutments and timber railing

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Table 3. SA3-A Impact of Constructed Features on Dredging Operations

Constructed Feature	Designation	Impact/Protective Measure
• Railroad bridges • 42-in. stormwater outlet • Failed sheet pile around 42-in. SWO • Conduit north side of bridge • Conduit south side of bridge	SA3-A-01	• Locate sheet pile cofferdam a minimum of approximately 20 ft downstream of bridge and outside of railroad easement. • Sandbag re-enforcement around outlet and sheet pile shall be installed to stabilize area during isolation and by-pass pumping operations. • Maintain safe work distance from conduits; sandbag protective barrier around north conduit to protect from sheet pile installation and bypass pumping operations.
• Timber utility pole and associated guy wires	SA3-A-02	• Further inspection on west side of creek has determined that utility line suspended on pole is severed and presumed abandoned; therefore, pole and guy wires will be removed.
• Concrete slabs bank stabilization	SA3-A-03	• Concrete debris will be removed and disposed of as needed to facilitate bank restoration and stabilization.
• Abandoned railroad bridge	SA3-A-04	• Excavation will be restricted to approximately 6 ft of bridge structure.
• Railroad bridge	SA3-A-05	• Downstream isolation dam will be installed approximately 20 ft upstream of downstream railroad bridge and outside of railroad easement.

3.1.3 Clearing and Grubbing of Access Road and Excavation Area

Clearing and grubbing may be very minimal to very extensive subject to the vegetative cover that will restrict access to the dredging areas. EQ will clear and grub two access road routes to the excavation area. The first will extend from an access point off of Michigan Avenue just east of the intersection with Pitcher Street. The second will extend from an access point off of Gibson Street just east of the railroad tracks located east of the intersection with South Pitcher Street. Clearing and grubbing of the access road routes will consist of bush-hog mowing a path to the excavation area. The area to the north of the excavation area will be widened to accommodate a support area, staging pad, and access road around it. The area to the south of the excavation area will take advantage of an existing access road route with additional clearing to accommodate a support area for the creek bypass pump and isolation dewatering systems as well

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as access by the fuel truck. The proposed extent of clearing and grubbing is depicted in Attachment 1 Figure 3, Staging Area.

EQ will clear and grub the entire western bank of the creek channel along the length of SA3-A to facilitate dredging. The eastern bank and flood plain will be cleared to facilitate excavation of the flood plain and installation of the bypass pump discharge pipeline. EQ intends to perform all clearing and grubbing in such a manner to protect the root mass in the overall work area to maintain soil stability.

Tree tops and tree trunks will be handled as described in the EQ Debris Management Plan dated September 2011.

3.1.4 Environmental Controls

EQ will install environmental controls per requirements established in the EQ Sedimentation and Erosion Control Plan dated September 2011. These environmental controls will include the following Best Management Practices (BMPs):

- Storm Drain Inlet Protection—EQ will install filtration fabric in storm drain inlets that are potentially impacted by site operations.
- Construction Exits—EQ will install a construction entrance just south of Michigan Avenue and north of Gibson Street as depicted in Attachment 1 Figure 4. Installed construction exits will either consist of an 8-ounce geotextile underlayment with a 6-inch-thick layer of 1- to 3-inch rock. The construction exits will be approximately 15 ft wide.
- Tire Wash Station—EQ will install and operate a portable tire wash station(s) between the support area and the entrance for the construction exits described above. After each truck is loaded with exhumed sediment, laborer(s) equipped with high-pressure water washer(s) will spray off the dirt from truck tires as they pass through the portable tire wash station prior to exiting the site. Wash waters will periodically be pumped to a temporary storage tank and trucked to the waste water treatment plant to maintain suitable storage capacity. Additional periodic maintenance will be required to remove sediment accumulations, which will be solidified and loaded into transfer trucks to be shipped to the John Street TCRA staging pad.
- Paved Surface Management—EQ will provide a power broom with a water tank to perform housekeeping of the paved work areas.
- Dust Control—EQ will provide a water truck for dust control for the mixing area and truck route.
- Fuel Station—EQ will fuel the heavy equipment in the support area depicted in Attachment 1, Figure 4, Site Infrastructure. A 300 gallon temporary fuel tank with secondary containment will be stationed at this location. A 1000 gallon temporary fuel tank with

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secondary containment will be stationed adjacent to the Bypass pump location. EQ will also provide emergency spill control kits that will include drums, oil dry, adsorbent pads, and a boom to address small spills that will be staged adjacent to the designated fueling areas.

- Sediment Curtain—EQ will install one or more Type II sediment curtains downstream of sediment removal operations perpendicular to the stream flow. Additional curtain(s) will be installed downstream of the cofferdams and bypass pumping discharge pads.
- Silt Fence—EQ will install a silt fence at the bottom of the slopes along both sides of the creek subsequent to completion of excavation activities to stabilize sediments until vegetation is re-established.
- Mulch Blanket—EQ will install additional mulch blanket as needed.
- Rock Discharge Pads—When EQ isolates an excavation area, bypass pumping will be required to maintain creek flow. EQ will isolate the entire SA3-A dredging area with one up-stream and one downstream coffer dam. Therefore, EQ will install one or more rock discharge pads downstream of each isolated section through which the discharge lines of the various bypass pumps will be directed to release their water. The rock discharge pads will be filled with rip-rap stone to dissipate discharge velocity.
- Turbidity Monitoring Station—EQ will establish turbidity monitoring station(s) to monitor the turbidity levels during removal operations. Real-time turbidity monitoring will be performed with stations set 300 ft upstream, 200 ft downstream, and 300 ft downstream of cofferdams set at each area. Turbidity monitoring will be recorded on half-hour intervals by a programmed data logger at the turbidity station. Other readings may be collected based on field conditions such as presence of visible runoff to the creek in the work vicinity, or as part of mitigation measures. Data will be transferred to a computer in the EQ command post trailer via a cellular modem. Further details concerning turbidity monitoring and corrective action measures are presented in EQ's Field Sampling Plan for Portage Creek Removal Area dated August 2011.

Additional environmental controls will be implemented as needed to supplement pre-construction controls as work progresses and site features are impacted by the sediment remediation activities.

3.1.5 Access Road Construction

EQ may only need to make minimal improvements to construct the access roads to the SA3-A support areas from Michigan Avenue and Gibson Street. Because the routes may traverse over vegetated railyards, clearing and grubbing of the routes should comprise the bulk of the work. Additional improvements may include placing geotextile and stone over areas of concern where wet and soft conditions may exist.

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3.1.6 Dredging Area Isolation

EQ will install two sheet pile cofferdams to isolate the dredging areas and facilitate dewatering to permit "dredging-in-the-dry" of the contaminated sediments. The location of the coffer dams is depicted in Attachment1, Figure 4, Site infrastructure.

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These cofferdams will be completed to an elevation approximately 6 inches above the average creek water level elevation. The elevation completion height has been specified by USEPA to allow storm water overflow into the isolated excavation area in the event of bypass pumping failure and/or a storm event to prevent upstream flooding due to sediment removal operations.

3.1.7 Bypass Pumping

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Creek channel bypass pumping will consist of capturing the stream flow from the creek from above the upstream isolation cofferdam and pumping it past the downstream isolation cofferdam and discharging captured creek waters on a rock discharge pad installed by EQ. Bypass pumping capacity will be specified to exceed 2 times the average creek flow of approximately 45 cfm. The subcontractor will be required to provide redundant pumps and ancillary equipment to allow for maintenance of the pumping systems without impacting dredging operations. There may be exceptions to this specification during bypass pumping around isolated areas where suitable work space is unavailable to operate multiple 18-inch discharge lines. Bypass pumping operations will be described in the subsequent water management subsection. The bypass pumping systems will be installed concurrently with installation of the upstream/downstream isolation cofferdam. Attachment 1, Figure 4, Site Infrastructure, depicts the location of the bypass pumps and discharge piping.

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3.1.8 Dredging Area Dewatering

EQ will provide a dewatering subcontractor to perform isolated dredging area dewatering. The subcontractor will install a series of PVC sipper wells with a jetting probe. The sipper wells will consist of PVC tubes on approximate 5-foot centers jetted to an approximate depth of 10 feet below the creek bottom surface elevation. Tubing will connect the sipper wells to a manifold pipe. The manifold pipe will be connected to a vacuum pump that discharges into a pipeline that

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transfers recovered water past the downstream isolation cofferdam onto the same discharge pads as the bypass pumping system. A vacuum will be placed on the sipper wells to extract water from the sediment. Several days of pumping will be permitted prior to the start of dredging to remove the maximum amount of moisture from the sediments prior to dredging. This will facilitate sediment removal with minimal solidification at the removal area. Minimizing water content in sediment has the following benefits:

- Requires less solidification material, thus lowering the purchase cost of solidification material.
- Decreases water weight in sediment, thus reducing disposal cost by reducing disposal tonnage.
- Decreases volume of solidification material, thus decreasing waste volume and tonnage disposal costs.
- Reduced use of solidification material reduces dust control issues associated with solidification.

The end result is a cost and safety benefit.

3.1.9 Pre-Excavation Topographic Survey

EQ will coordinate with the EPA FIELDS Group to perform a pre-excavation survey of the removal area to fill in data gaps not captured when surveying the transect lines. This survey data will be used for multiple purposes. First, it will document the pre-removal topographical condition of the creek channel. This serves as a baseline to measure the performance of contaminated sediment removal and creek channel stabilization/backfill activities. To accomplish this, the survey data will then be loaded into the Real-Time Kinematic–Global Positioning System (RTK-GPS) equipment mounted on the excavators used for dredging to guide excavation/backfill efforts and ensure the lateral/vertical extent of contaminated sediment removal and backfill restoration is performed correctly.

3.2 Contaminated Sediment Removal

Sediment removal will be removed in two phases to complete flood plain and creek channel excavation. Sediment removal will begin in SA3-A within the flood plain area east of the creek channel. This will require multiple handling steps for completion. The long-reach excavator

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The abandoned railroad trestle that crosses the creek through excavation Grids SA3 A-7 and A-8 will be demolished to facilitate contaminated sediment removal. EQ will utilize on-site heavy equipment to demolish and remove the structure. Support piers will either be completely extracted or removed to 3 ft below existing grade. Recovered steel will be recycled as scrap ferris metal, and remaining debris will be disposed of at the Subtitle D Landfill. Debris and scrap steel will be processed as needed to facilitate disposal and/or recycling. ¶

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will excavate the flood plain area from south to north and place exhumed soils into the isolated dewatered creek channel. A second excavator working from the west bank will remove these soils and place them into off-road dump trucks (ORDTs) for transfer to the staging pad for subsequent shipment off site.

Sediment in the creek channel will be removed from the top of the bank with a long-reach excavator equipped with RTK-GPS equipment. Bypass pumping will be performed to maintain creek flow and storm water drainage. Sediments will be solidified sufficiently in place to allow ORDTs to move material to the temporary staging pad for final dewatering/solidification and subsequent shipment for disposal. Exhumed material will be directly loaded and shipped from the staging pad. Post-removal sampling and surveying will be performed to verify that cleanup objectives have been met. Once isolated removal area objectives have been meet, toe of bank stabilization and backfilling will be conducted along with survey verification.

3.2.1 Water Management

Bypass pumping operations will begin after completion of the dredging area isolation and installation of the bypass pumping systems. Bypass pumping will operate 24 hours per day 7 days per week until the isolated dredging area is dredged, the area is confirmatory surveyed/sampled, toe of bank stabilization is completed, and the area is backfilled. Bypass pumping will be terminated during rain and associated flooding events that exceed pumping capacity, and creek flow will be permitted to enter the isolated dredging area; bypass pumping will resume subsequent to flood crest. The discharge of bypass pumping waters will not require a Substantive Requirements Document (SRD).

Next, the isolation area dewatering pumping system will be operated 24 hours/day 7 days/week until the isolated dredging area is dredged, the area is confirmatory surveyed/sampled, bank stabilization is completed, and the area is backfilled.

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3.2.2 Dredging of SA3-A

3.2.2.1 Sediment Removal

As previously stated, sediment removal in the SA3-A removal area will begin in grid SA3-A3 (flood plain). Access to the SA3-A3 floodplain will be established by placement of wooden swamp mats over the dewatered creek channel in grids SA3-A3, A4 and A5. Excavation will begin in the flood plain by removing soil and depositing material in the dewatered creek channel where a second excavator will add solidification agent, if needed, using established methods and protocols. The second excavator will load material into ORDTs for transfer to the temporary staging pad. Excavation will proceed to the north in this manner to the northern extent of grid SA3-A3. The flood plain will be backfilled using on site soils, as appropriate, prior to commencement of dredging operations in the creek channel (grids SA3-A1 to A8).

EQ will then dredge contaminated sediments grids SA3-A1 to A8 using a top-of-bank dredging approach subsequent to surface dewatering the isolated sections. EQ will dredge the isolated areas from atop the western bank by using a long-reach excavator equipped with a RTK-GPS. EQ will solidify sediments in the creek bed or in solidification boxes (as/if needed) to prepare them for transfer to the temporary Staging Pad. EQ may use one or a combination of three solidification materials that include Calciment ®, crystallized polymer, and/or corn cob grit. The long-reach excavator will use a smooth-edge bucket to exhume sediments to the target depth in each grid, clearing sediment from the east bank to the west bank as removal progresses to the north in a downstream direction. Once sediments are sufficiently solidified, the excavator operator will load the ORDTsfor transfer to the temporary Staging Pad.

3.2.2.2 Contaminated Sediment Removal and Transfer to Staging Area

ORDTs will advance from the excavation areas and will deposit their load on the temporary staging pad. ORDTs will back up an approach ramp to the staging pad, and will raise their dump bed after cresting the top of the berm. Heavy equipment on the staging pad will remove material from the dump area to ensure ORDTs are not tracking into dumped sediments. ORDTs will then return to isolation areas for continued loading. The load-out area at the creek side will be covered with plastic sheeting draped back into the active excavation area to allow for

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containment and recovery of spillage from loading operations. Excavator operators will take special care during loading so as to not spill sediment.

3.2.2.3 Post-Excavation Sampling

EQ will support the START contractor in post-excavation sampling of the contaminated soil removal area following the methods and procedures described in the confirmation sediment collection sampling described in the FSP. EQ will provide laboratory analyses through a competitively procured laboratory. Sampling and analyses will be performed in accordance with the QAPP and FSP prepared by EQ for the site dated September 2011 and August 2011, respectively. Sampling locations will be marked in order to document locations during post-excavation survey operations. Turnaround time for sample analyses will be determined at/or near the time of collection subject to time constraints with other site operations. Based on observations made and field experience during calendar year 2012, excavation will proceed to the initial target depth, and if visual contamination is still apparent in the grid(s), samples will be collected in every other grid of the slope area to verify remaining contamination. If over-excavation is warranted in a particular grid(s), it will be over-excavated until visual evidence of paper sludge or contaminated sediment has been removed. At that time, samples will again be collected in each grid. If cleanup performance standards/goals are met in each grid, work will proceed to backfill the excavation. If any grid fails to meet performance standards/goals, the excavation and sampling process will be repeated as needed (or as directed by the EPA OSC) prior to backfilling.

3.2.2.4 Post-Excavation Survey

EQ will coordinate with the EPA OSC to provide post-excavation elevations by taking at least 3 final depth measurements in each grid using the RTK-GPS system on the excavator. EQ will provide the measurements to the EPA OSC to facilitate the required volume removal calculations by the EPA FIELDS Group.

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3.2.2.5 Toe of Bank Restoration

The floodplain and toe of banks will be restored as described in EQ's Restoration Plan dated September 2011 as well as a site-specific restoration plan to be developed in coordination with the landowners.

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3.2.2.6 Backfill of Creek Bottom and Floodplain

EQ will deploy backfill using rip rap, river rock, and a sand and gravel mix (bank run) to backfill the creek bottom in accordance with EQ's Restoration Plan dated September 2011. Floodplain areas (grid SA3-A3) will be backfilled with on site soils as appropriate.

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3.2.2.7 Post-Backfill Survey

EQ will coordinate with the EPA OSC and EPA FIELDS Group to conduct post-backfill surveying of SA3-A. EQ will prepare as-built drawings and make required volume removal calculations.

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3.2.2.8 Post-Sediment Removal Condition Assessment

EQ will provide a structural engineer to perform a post-sediment removal assessment of constructed features in and adjacent to the creek channel excavation areas. Details of this assessment will be provided in a report prepared by a professional engineer. The report will identify the same structural features presented in Table 2 along with any impacts of dredging operations on the constructed features.

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EQ will coordinate with the EPA OSC and EPA FIELDS Group to conduct post-excavation surveying of SA3 grids subsequent to successful removal of contaminated soil to cleanup performance standards/goals. The EPA FIELDS Group will perform post-excavation surveying to document removal depths. The EPA FIELDS Group will provide survey data to EQ to generate as-built drawings and make cut-to-fill calculations to determine the volume of contaminated soil removed.¶

3.2.3 Site Restoration

3.2.3.1 Removal of Excavation Facilities and Equipment

EQ will remove non-essential facilities and equipment from the work area to restore the site to pre-existing conditions. The fuel tanks, excavation equipment, tire wash station, cofferdams, pumps, pipelines, etc., will be removed.

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3.2.3.2 Restoration Planting

EQ will perform restoration planting as described in EQ's Restoration Plan dated September 2011. The final site-specific restoration design plan will include stakeholder input by landowners.

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3.2.3.3 Restoration Planting Monitoring

EQ will provide monitoring and corrective action/maintenance for a period of 1 year from the restorative planting date or as directed by EPA in accordance with EQ's Restoration Plan dated September 2011. EQ will also maintain erosion sediment controls until re-vegetation planting is accepted or as directed by EPA.

3.2.3.4 Facility Impact Repair

EQ will make repairs to the sediment removal sites caused by sediment removal operations. EQ, EPA, and the appropriate property owner stakeholder will review pre-existing photo-documentation to develop a punchlist of any necessary repair items to be addressed prior to complete demobilization from the SA3-A contaminated sediment removal area. EQ anticipates (at a minimum) that this will include perimeter fence repair/replacement, lawn repair and landscaping of disturbed areas, asphalt/concrete patching, and general housekeeping.

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ATTACHMENT 1

FIGURES

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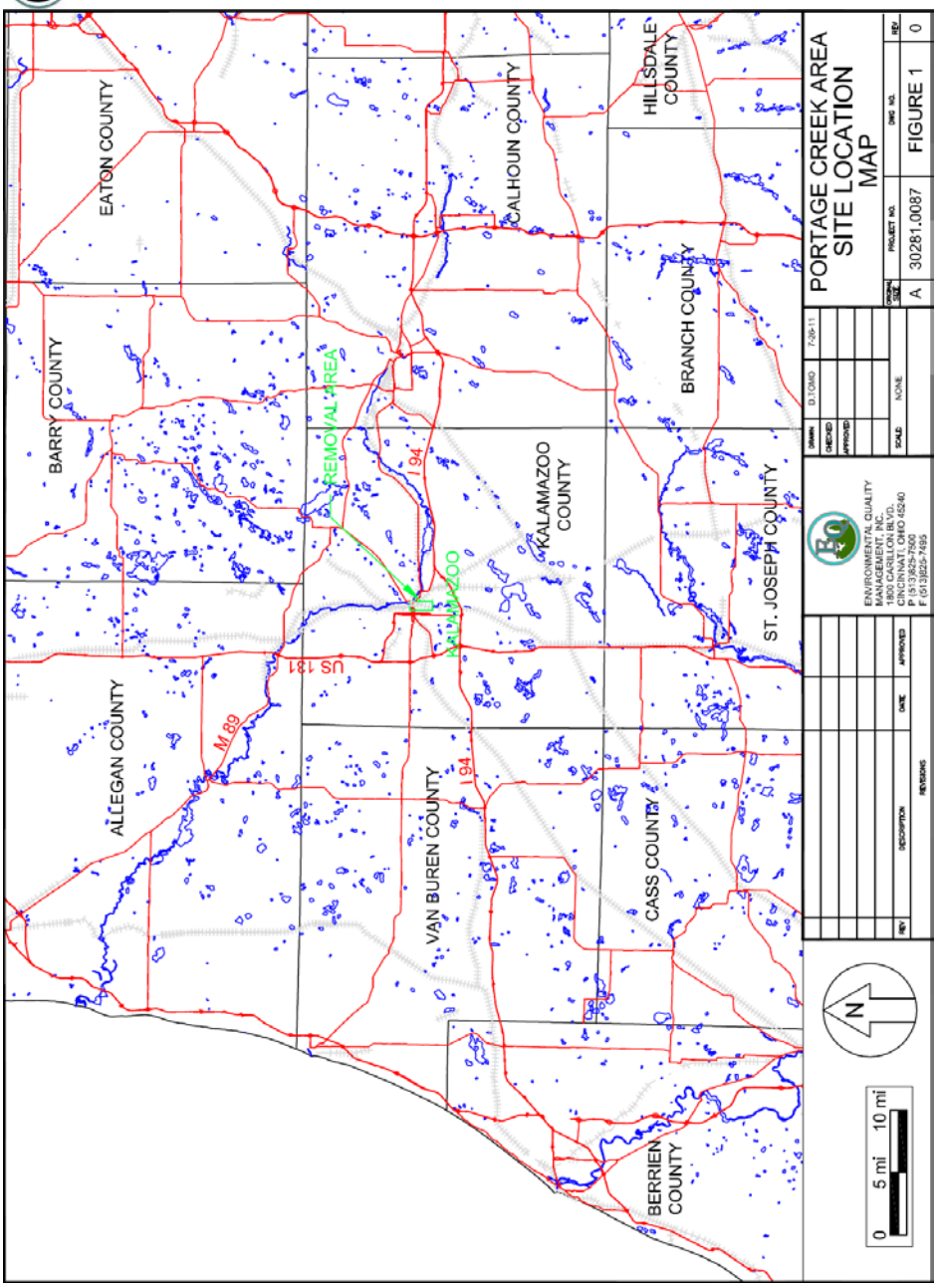

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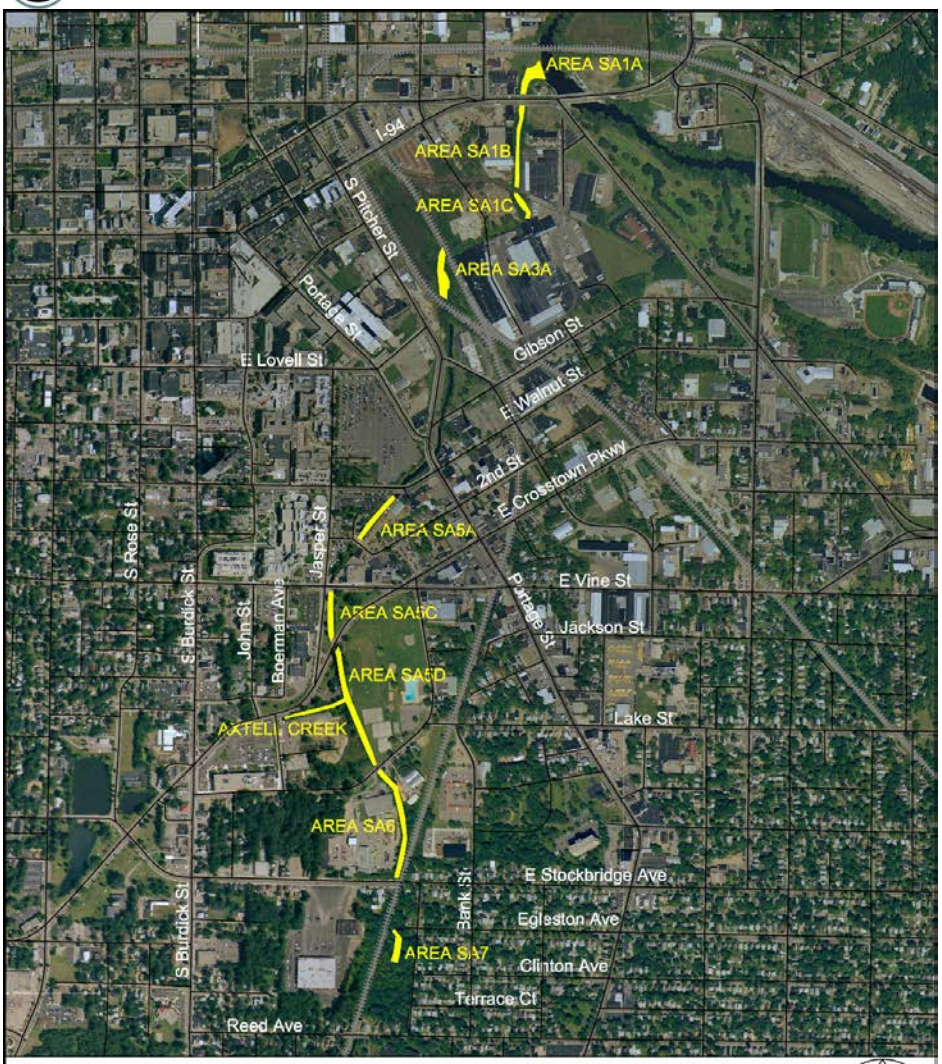

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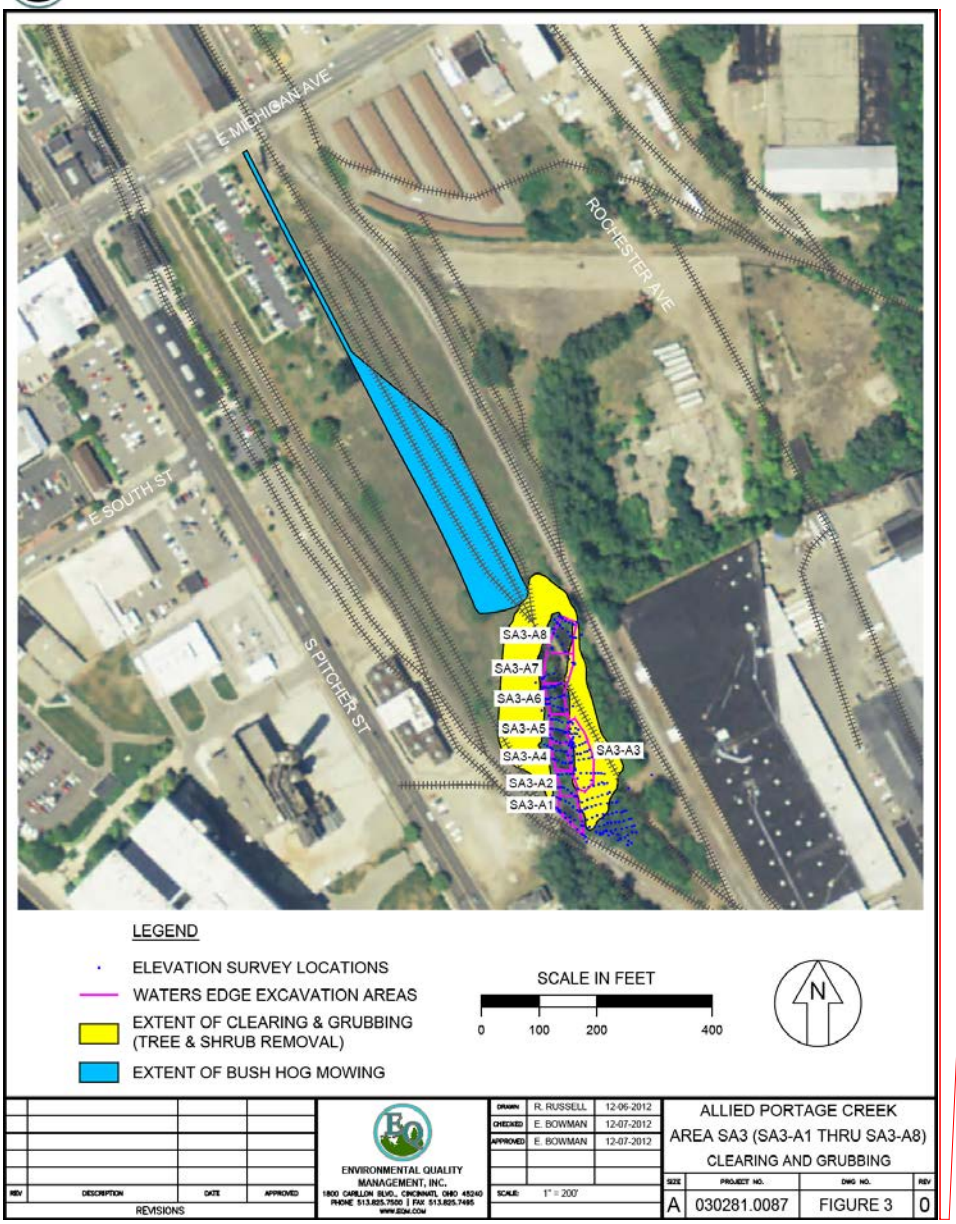

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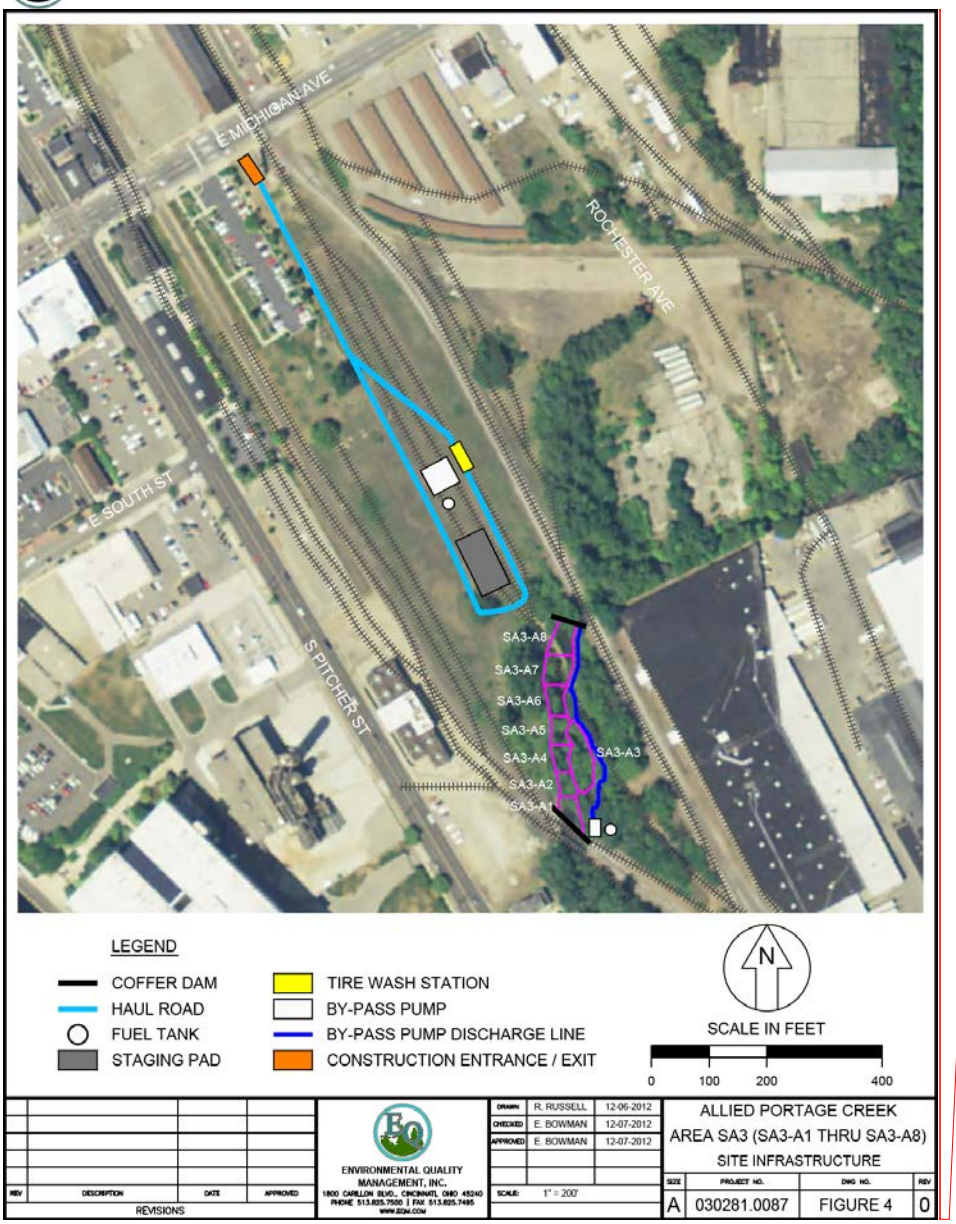

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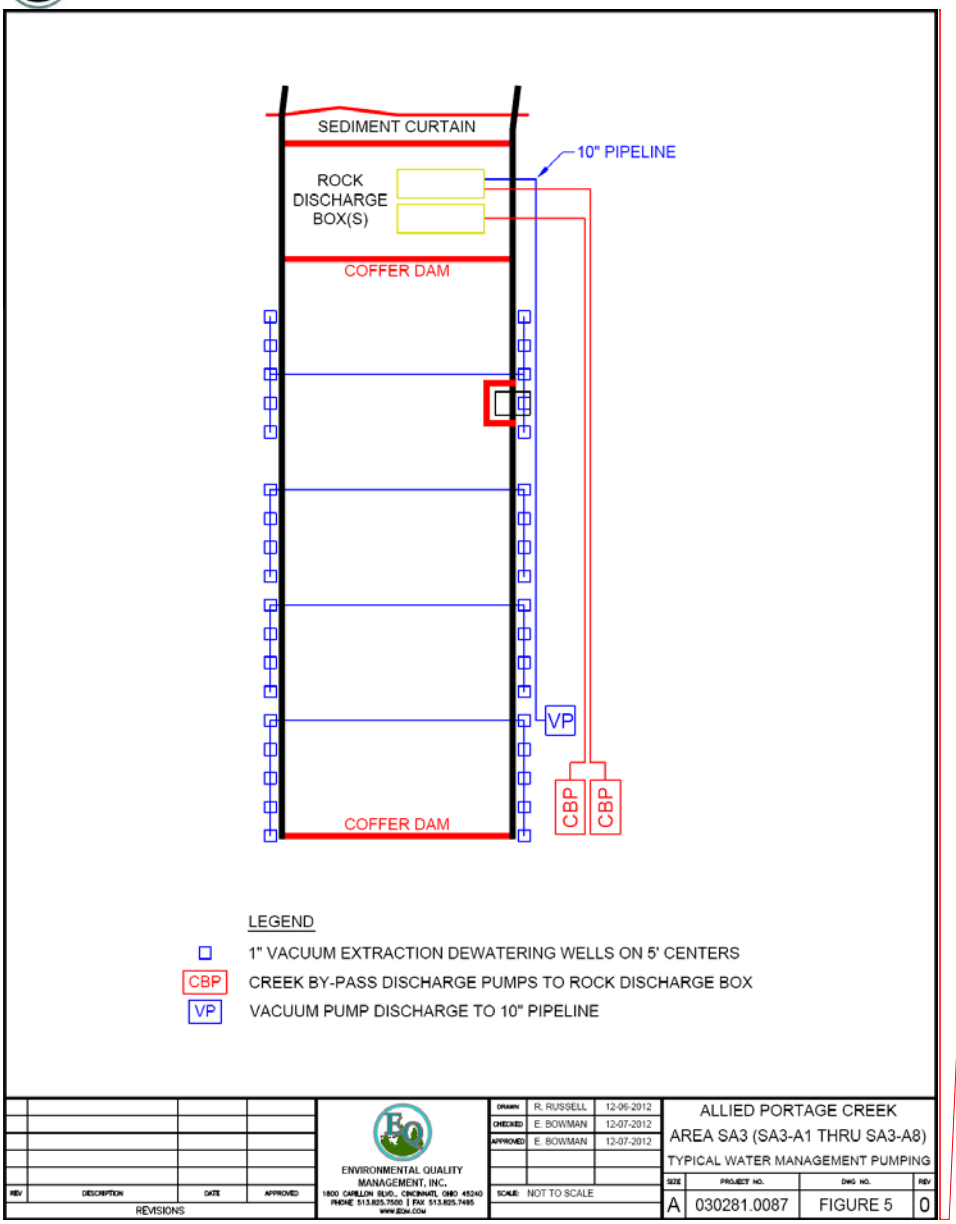

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